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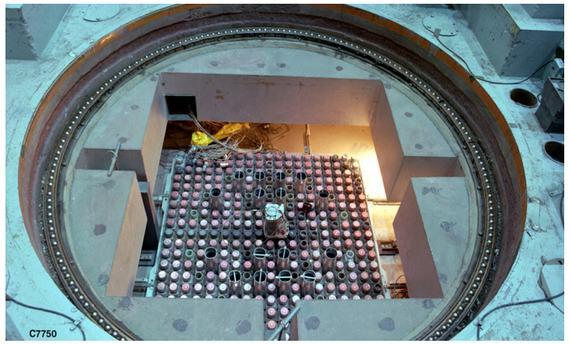
a RTG for another mission to Mars planned for launch in 2020. The INL is an active partner with Oak Ridge National Laboratory to re-establish domestic production of Pu-238 for the first time since the 1980's. This isotope is key to providing the fuel for the RTGs for missions to remote or hostile environments. The INL is also an active partner with DOE in planning for the use of reactor technology in space applications such as nuclear thermo propulsion.

Isotope production

The Idaho National Laboratory Advanced Test Reactor (ATR) is designed primarily as a nuclear fuel and materials test reactor for the DOR/NNSA Naval Reactors program and the DOE office of Nuclear Energy. Because of its high neutron flux and large volume of irradiation space, the ATR lends itself to isotope production as well.

Although not a primary mission, ATR is well suited to produce significant quantities of high specific activity (HSA) isotopes for industrial and medical applications and is currently producing HSA 60Co, which has many uses including sterilization of medical instruments, a gamma ray source in medical radiotherapy to treat cancer, industrial radiography, and food and blood irradiation. The ATR is also scheduled to begin production of 192Ir, which is commonly used as a gamma ray source in industrial radiography to locate flaws in metal components and in radiotherapy as a radiation source, in particular in brachytherapy.



INL is preparing to restart the Transient Reactor Test (TREAT) facility to enable thorough testing of reactor fuels and materials under accident scenarios.

Infrastructure

INL's hosts an expansive array of research facility complexes spread across DOE's 2,300 square kilometer (890 square mile) Idaho Site and within the city of Idaho Falls. Combined with the talent of the world-class researchers at INL, these national assets make INL an international leader in nuclear energy technology research and development. The laboratory has three major facility areas focused on nuclear research & development:

- Materials and Fuels Complex - The Materials and Fuels Complex hosts an extensive array of nuclear fuel fabrication, examination and handling facilities, including the Hot Fuel Examination Facility, Fuel Manufacturing Facility; Irradiated Materials Characterization Laboratory; Experiment Fuels Facility; and the Space and Security Power Systems Facility.
- Advanced Test Reactor Complex – Hosting the world's premier nuclear test reactor, the Advanced Test Reactor Complex also features the Advanced Test Reactor-Critical Facility, the Test Train Assembly Facility, Radiation Measurements Laboratory, Radiochemistry Laboratory and the Safety and Tritium Applied Research Facility..
- Research and Education Campus - The landscape of INL's Idaho Falls-based campus has evolved markedly in the past 10 years with several new facilities. The Energy Innovation Laboratory is the gateway to INL's Idaho Falls campus. Other important capabilities include the INL Research Center, the Center for Advanced Energy Studies, National and Homeland Security office and engineering facilities, and the Energy Systems Laboratory.

For more information

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The Energy of Innovation

INL Idaho National Laboratory

NUCLEAR ENERGY

New and current reactor fuels can be examined at an unprecedented level of detail after samples are prepared for electron microscopes and other advanced characterization equipment within INL's Irradiated Materials Characterization Laboratory.

Nuclear Programs

Nuclear Power Pioneers

In 1949, the U.S. Atomic Energy Commission established the National Reactor Testing Station – now known as Idaho National Laboratory (INL) – to take on the top-priority mission of harnessing the power of the atom for peaceful applications.

In the years that followed, thousands of world-class scientists and engineers made Idaho their home, and devoted their careers to advancing the state of the art in nuclear research and development. The results of their labors are legendary.

- In 1951, Experimental Breeder Reactor-I produced the first usable amounts of electricity from nuclear power.
- In 1955, the Borax-III reactor provided electricity to Arco, Idaho – the first time a nuclear reactor powered an entire U.S. community.
- The Advanced Test Reactor, one of the world's most consistently updated and capable materials test reactors, became one of the two primary reactors in the nation used to produce life- saving medical and industrial radioisotopes.
- The laboratory developed prototype nuclear propulsion plants for Navy submarines and aircraft carriers.

Over the years, INL's mission broadened into areas such as biotechnology, energy and materials research, and waste treatment and cleanup of Cold War-era sites. Today, INL is focused on meeting the nation's energy, nuclear technology, science, and national and homeland security needs.

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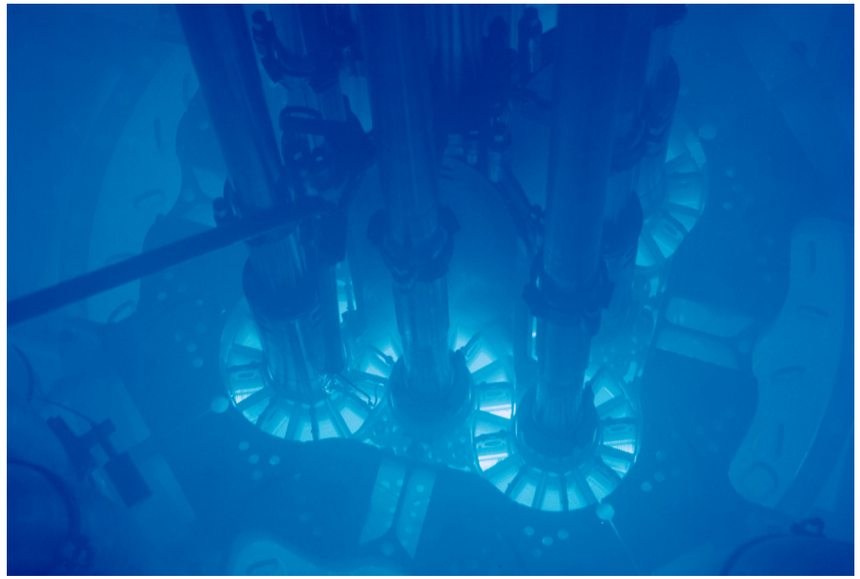
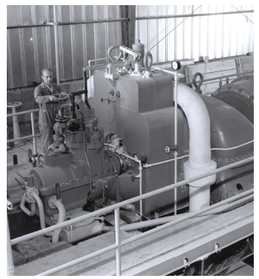


INL's Advanced Test Reactor is the world's most versatile reactor for performing irradiation testing necessary for developing new reactor designs.



Borax-III was the first nuclear reactor to power an entire U.S. community.

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Sustaining the current fleet of power reactors

INL researchers support the Light Water Reactor Sustainability program by developing the scientific basis to extend existing nuclear power plant operating life beyond the current 60-year licensing period and ensure long-term reliability, productivity, safety, and security. INL serves as the Technical Integration Office and coordinates the research and development projects.

Fuel Cycle Research and Development

Researchers at INL are pursuing the development of fuel cycle technologies that will meet the need for economic and sustained nuclear energy production. The systems and processes under research and development should enable a significant reduction in the amount of high-level radioactive water requiring geologic disposal, reduced accumulation of plutonium in civilian spent fuel and the extraction of more useful energy from nuclear fuel.

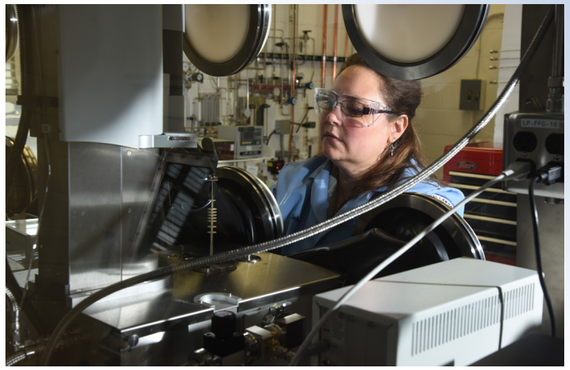
Gateway for Accelerated Innovation in Nuclear (GAIN)

OE-NE has established the Gateway for Accelerated Innovation in Nuclear (GAIN) to provide the nuclear community with access to the technical, regulatory, and financial support necessary to move new or advanced nuclear reactor designs toward commercialization while ensuring the continued safe, reliable, and economic operation of the existing nuclear fleet. GAIN provides the nuclear community with a single point of access to the broad range of capabilities—people, facilities, materials, and data—across the DOE complex and its National Lab capabilities.

Advanced Reactor Technologies (ART)

The Advanced Reactor Technologies (ART) Program develops new and advanced reactor designs and technologies to improve nuclear energy competitiveness and support meeting the nation's energy, environmental, and national security needs. The INL ART Technology Development Office leads the area of high temperature reactor R&D in support of high-temperature, heat-generating missions. It includes developing and qualifying tristructural isotropic fuel; source selection, development, testing, and qualification of high temperature materials and nuclear grade graphites; verification and validation of design methods; and coupling of nuclear and renewable energy sources to better optimize energy use for the combined electricity, industrial manufacturing, and transportation sectors. Activities within the licensing area of the ART Program are focused on overall reduction of advanced reactor technology development risks by addressing regulatory issues that will facilitate future NRC licensing.

New equipment installed in INL's Analytical Laboratory enables thermal properties testing on fuel and material samples.



Nuclear benefits beyond electricity

The INL is the world's leader in applying solid oxide fuel cell technology towards nuclear-powered water splitting and CO_2 splitting for hydrogen and syngas production. INL's goal is to diversify nuclear energy end uses beyond electricity production to economical hydrogen and synfuel production via recycling water and CO_2, with the simultaneous benefits of reducing greenhouse gas emissions and enhancing electrical grid stability.

INL researchers work directly with facility operators and engineers to examine experimental fuel and material samples.

Radioisotope Power Systems and Space Technologies

Radioisotope power systems are used to provide heat and electricity for space exploration missions and national security applications. The INL assisted in providing radioisotope heater units for the two rovers that went to Mars in 2003, Spirit and Opportunity. INL assembled a radioisotope thermoelectric generator (RTG) for the New Horizons mission to Pluto in 2006, which recently completed its flyby of Pluto in July of 2015. The INL also assembled and fueled a new design of RTG for NASA's Mars Science Laboratory, which launched in 2011 and arrived at the red planet in 2012 and is conducting an extended mission through at least 2016. Preparations are also under way for providing

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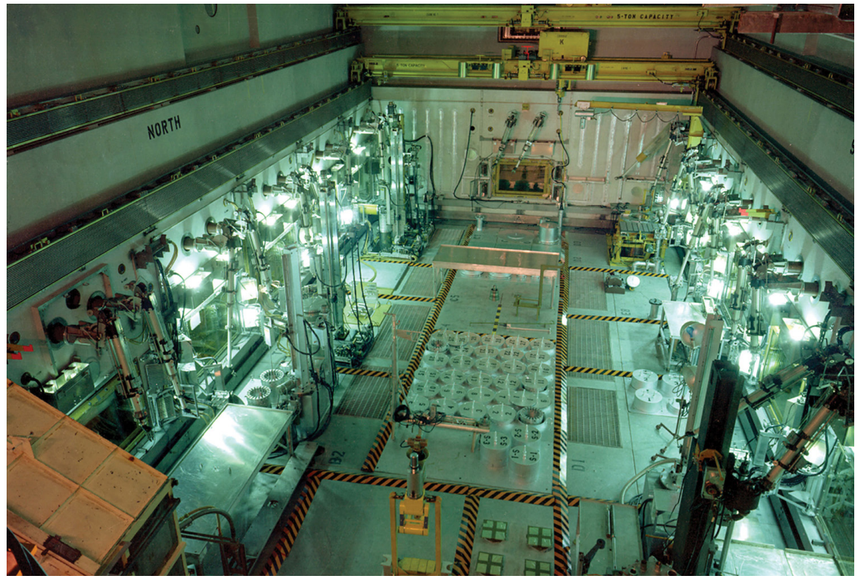
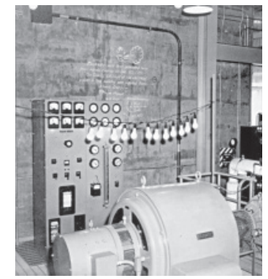
NUCLEAR ENERGY



INL's Hot Fuel Examination Facility is equipped with one of the largest inert-atmosphere hot cells in the world, hosting an expansive suite of post-irradiation examination capability on samples from the tiniest experimental sample up to fuel rods more than 13 feet in length.



EBR-I produced the first usable amounts of electricity from nuclear power.